

# **VEHICLE RECOVERY SYSTEM AND METHOD**

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## **CROSS REFERENCE TO RELATED APPLICATIONS**

**[01]** This application claims priority under 35 U.S.C. § 119(e) from provisional application number 60/492,675, filed August 6, 2003. The 60/492,675 provisional application is incorporated by reference herein, in its entirety, for all purposes.

## **BACKGROUND OF THE INVENTION**

### **Field of the Invention**

**[02]** The present invention relates generally to vehicle security devices and more specifically to vehicle recovery systems and methods.

### **Background Information**

**[03]** Many anti-theft and recovery systems and methods for vehicles are well known. Some methods include a transmission device in the automobile generating signals so that a satellite tracking system can locate a misappropriated vehicle. Another system requires a positive act by the driver of the automobile to occur, otherwise some form of alarm, vehicle disablement or both be initiated.

**[04]** Some of the alarms are audible, visual or both. Sometimes the wrongful driver is informed that a recovery action, disablement or both will occur in anticipation that the wrongful driver will abandon the misappropriated vehicle.

**[05]** Some recovery methods invoke initiation of an alarm, disablement or both remotely. This remote action is precipitated after discovery of the misappropriation of the vehicle. Remote invocation requires some type of remote signal to be received by a recovery processor within the vehicle. Typically the receiver is a radio receiver or a mobile phone. The invocation of the remote signal may be done by the vehicle owner or by a recovery service.

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- [06]** Some recovery methods invoke an alarm, a disablement action, or a tracking transmission based on an omission or incorrect action by the driver. This automatic action is precipitated by a processor detecting the starting of the car in deviation of a prescribed method. Detection of the misappropriation of the vehicle by the processor causes some combination of recovery methods to be invoked such as turning on a visual alarm, turning on an audible alarm, disabling the vehicle and/or transmitting a radio signal to allow tracking of the misappropriated vehicle. An audio message may be played in the vehicle cab in conjunction with the other actions.
- [07]** Some methods are anti-theft devices that disable the vehicle absent some action by the vehicle operator.
- [08]** Many of these methods and systems are effective. Some are costly. Some require expensive subscriptions to a recovery agency, a tracking system, a mobile phone subscription or other perpetual fee service.
- [09]** Some of the recovery systems tend to be less efficient, particularly where the public is required to intervene when visual and/or audible alarms occur.
- [10]** **U.S. Patent No. 5,805,057** issued to Eslaminovin pertains to a remote vehicle disabling and distress indicator system. The indicator system is activated by either an external telephone call or by an internal manual switch. The telephone call is received by a modular telephone stored in the vehicle. In the alternative, the vehicle operator can manually turn on an activation switch. Activation of the indicator system disables the vehicle by deactivating the ignition, closing a fuel valve, etc. The signal also causes a distress sign at the top of the vehicle to be illuminated. Detection of the distress sign requires line of sight viewing of the vehicle. The signal will also turn on a pre-recorded distress message audibly detectable by nearby members of the public. This system to be effective requires

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voluntary, altruistic intervention by a passer by. A continuing expense for maintaining a modular telephone within the vehicle is encountered.

- [11] U.S. Patent No. 6,150,926** to Flick describes a vehicle security system including an indicator mounted to a window antenna unit. The security system responds to signals from one or more remote user transmitters. The system controller includes an alphanumeric display positioned inside the windshield alerting the user to security conditions. The vehicle's alarm system is armed and failing to receive a correct transmission signal from a user transmitter causes audible (horn) and visual (headlights) to go into an alarm mode. Further, a security controller disables the vehicle, thus preventing theft by an individual not using a correctly coded transmitter. This patent is a preventive theft system and requires an active intervention by a user to disarm the alarm and disabling system.
- [12] U. S. Patent No. 6,392,531 B1** to Gabbard teaches a vehicle disabling system employing a global positioning satellite. The satellite is capable of locating the vehicle through GPS tracking. A remote unit transmits a shutdown command via a global positioning satellite to a target vehicle. No alarm or public involvement is used to recover the disabled vehicle.
- [13] U.S. Patent No. 5,969,433** to Maggiora et al. use a central service to monitor vehicles where the vehicles communicate sensor readings via a global positioning system or Teletrac. Upon detection of some out of normal condition, a message is sent to the vehicle to correct the condition. If a "panic" condition is detected, the operator is alerted at his workstation. Under appropriate conditions, the vehicle is disabled. This invention applies primarily to transport fleet operations and is designed to prevent theft from the vehicle and/or hijacking. There is no public involvement in the vehicle recovery.

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**[14]**     **U.S. Patent No. 6,069,411** to Charron describes an ignition system that requires the insertion of a mobile phone into the circuitry. If the phone's serial number ESN or IMEI matches the pre-established serial number. If so, the circuitry is closed, allowing the vehicle to operate. If the serial number is not correct, the circuitry remains open and results in disablement of the vehicle. This patent is an example of any number of vehicle anti-theft devices requiring the vehicle operator to actively intervene before the vehicle will operate. Thus, this patent pertains to an anti-theft device and not a recovery device.

**[15]**     Two other patents noted, **U.S. Patent No. 5,708,307** to Iijima et al. and **U.S. Patent No. 6,404,073 B1** to Chiang, teach anti-theft systems. The first uses a transmitter-receiver system to read and transmit the code on an ignition key. Failing to receive a valid code, the motor vehicle is disabled. The latter patent uses oil pressure jacks built into the under carriage of the vehicle. If a valid key code is not detected prior to starting the car, the oil pressure jacks lift the vehicle off of the ground thus preventing the vehicle from being driven away.

**[16]**     What is required is a vehicle recovery system and method that is relatively inexpensive and efficient.

### SUMMARY OF THE INVENTION

**[17]**     It is an object of the present invention to provide a vehicle recovery system and method that is based on a highly detectable alarm not requiring line of sight to the vehicle. A preferred embodiment of the present invention uses a smoke flare as the alarm.

**[18]**     It is another object of the present invention to provide a vehicle recovery system and method that is remotely invoked.

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- [19]** It is still another object of the present invention to provide a vehicle recovery system and method that is remotely invoked with wireless communication utilizing unlicensed radio frequency spectrum.
- [20]** It is one more object of the present invention to provide a vehicle recovery system and method that can be automatically invoked.
- [21]** It is still another object of the present invention to provide a vehicle recovery system and method that also disables the vehicle to be recovered.
- [22]** A further object of the present invention is to provide a vehicle recovery system and method that involves a responsive public. The public is educated to recognize the meaning of the highly detectable smoke flare. Further, the public is encouraged, through an incentive, to report the location of the highly detectable smoke flare source.
- [23]** It is another object of the present invention to provide a vehicle recovery system and method that detects vehicle speed before disabling the vehicle.
- [24]** It is yet another object of the present invention to provide a vehicle recovery system and method that detects if the vehicle is in an enclosure before invoking a smoke flare alarm.
- [25]** The present invention is a method and system that executes a recovery of a misappropriated vehicle by setting off a highly detectable smoke flare. The alarm does not require line of site to the misappropriated vehicle for detection. Recovery, in alternate embodiments, is initiated remotely or automatically. Remote initiation, in an embodiment, is based on wireless communications over unlicensed RF spectrum, thus avoiding the expense of maintaining a mobile phone subscription for the vehicle. Further, other embodiments of the present invention allow for vehicle disablement along with discharge of an alarm. Still

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other embodiments incorporate sensing vehicle speed and whether the vehicle is in an enclosure before disabling and alarm discharge.

### BRIEF DESCRIPTION OF THE DRAWING

- [26]**     **Figure 1** is a schematic of the present invention.
- [27]**     **Figure 2** is a schematic of the public's involvement along with the recovery service agency in the present invention.
- [28]**     **Figure 3** is an expanded schematic of the Misappropriation Signal and the Alarm Discharge Apparatus.

### DETAILED DESCRIPTION OF THE INVENTION

- [29]**     Referring to **Figure 1**, a schematic of the present invention, is illustrated. A Misappropriation Signal **100** initiates the vehicle recovery system. In one embodiment of the present invention the misappropriation signal is transmitted from a remote source. In another embodiment of the present invention logic within the vehicle generates an internal recovery signal.
- [30]**     The Alarm Discharge Apparatus **200**, an on board processor in one embodiment, implements vehicle recovery once the misappropriation signal **100** is received. A vehicle alarm **300**, detectable outside of the vehicle, is discharged. This alarm is detectable beyond line of sight to the vehicle. It may be a loud, audible alarm, a highly detectable visual alarm or some combination. In a preferred embodiment of the present invention, the vehicle alarm is a smoke flare discharged after the flare has been positioned to clear the vehicle.
- [31]**     The Public Response System **400** allows a member of the public having

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detected the vehicle alarm a means to communicate the alarm detection and approximate location of the vehicle. Incentive to communicate the whereabouts of the vehicle is provided by a public campaign publishing the alarm's description and offering a reward to report the alarm detection. An easily remembered toll free number is provided to the public to ease the communication process.

- [32] The Recovery Service Agency **500** directs recovery operations, whether called by a member of the public, a law enforcement agency or a subscriber to the recovery service. Approximate location of the vehicle is
- [33] Referring to **Figure 2** the Public Response System **400** and Recovery Service Agency **500** schematic is illustrated in greater detail. Through an education campaign, members of the public are educated as to the meaning of the vehicle alarm. The highly detectable vehicle alarm, which, in a preferred embodiment is a smoke flare, is taught to mean that the vehicle from which it has been discharged is being misappropriated **402**. The public is further instructed that an easy communications means **404** is available for reporting the detection of the vehicle alarm. Figure 2, for example, uses a hypothetical toll free number, 555-CARBACK.
- [34] Further, the public is also advised that there is an incentive to make the recovery call, This incentive, in a preferred embodiment is a reward **404**. A further advantage is that by calling the Recovery Service Agency **500** an individual does not have to get involved with local law enforcement agencies, although she may opt to so. The police (or other law enforcement agency) may also use the communications means **404** provided to contact the recovery service agency **500**.
- [35] The recovery service agency **500**, in alternative embodiments, receives communications from the public and/or the police **404**, a Recovery Service Agency Subscriber **410** and/or an Internal Recovery signal **104** (discussed in

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more detail *infra*). The Internal recovery Signal is transmitted from the vehicle itself.

- [36] The recovery service agency **500** directs the recovery operations. Upon a reported detection and approximate location of the alarm, a recovery service agency operator contacts a law enforcement agency local to the detection location. In a preferred embodiment, the vehicle has been disabled, thus making recovery easier. Further, in another embodiment of the present invention, the vehicle broadcasts a vehicle recovery signal **420** to the recovery service agency **500**.
- [37] Transmission of the vehicle recovery signal **420** is made alternatively by a mobile telephone installed in the vehicle, by a radio transmitter using Short Range Radio (SRR) frequencies utilizing radio spectrums in unlicensed bands, or by some combination of the two. The mobile cell phone industry, in its migration to third generation (3G) standards, has begun employing unlicensed radio frequencies to support inexpensive wireless networks. The unlicensed SRR frequencies provide superior data packet wireless transmission and provide support for wireless networking standards IEEE 802.11(a) and (b), and Bluetooth as well as variations thereon.
- [38] In a preferred embodiment of the present invention, the Recovery Service Agency **500** is in a wireless data network with vehicles under subscription. This network would allow data transmission between the vehicles and the Recovery Service Agency **500**. Since the frequencies used are unlicensed, the subscriber avoids the cost of maintaining a cellular phone in the vehicle. There would be the cost of a transceiver installed in the vehicle and the cost of maintaining a subscription.
- [39] In an embodiment of the present invention, a Recovery Service Agency



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Subscriber **410** contacts the Recovery Service Agency **500** upon discovery that the subscriber's vehicle has been misappropriated. This contact **410** is made by phone, network messaging, or other means. Subscription identifier, password and other information are passed to the Recovery Service Agency **500**. In an embodiment of the present invention, a wireless network address for each vehicle is part of the database maintained by the recovery service agency. Using the vehicle's network address, a network wireless transmission is communicated from the agency as an External Recovery Signal **102** to the misappropriated vehicle to initiate recovery actions.

**[40]** In another embodiment, the external recovery signal **102** is communicated from the recovery service agency **500** to the vehicle by cellular phone transmission. This recital of communications means is not meant to exclude other present and future remote communications technologies.

**[41]** Additionally, the recovery service agency **500** performs administrative functions such as contact law enforcement agencies **502** and members of the public **504** to dispense any rewards or explanations as required.

**[42]** Referring now to **Figure 3**, an expanded schematic of the Misappropriation Signal and the Alarm Discharge Apparatus are illustrated. This illustration details the recovery activities performed at the vehicle.

**[43]** In one embodiment of the present invention, the Misappropriation Signal **100** is initiated external to the vehicle **104** or may be initiated internally **106**. A RF receiver **204** receives the external recovery signal **104**. As discussed above, the receiver **204** may be a cell phone, a wireless radio receiver operating in the unlicensed spectrum, or any wireless technology capable of completing the data transfer. The initiator of the external recovery signal may be the vehicle owner, the recovery service agency or appropriate law enforcement agency.

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- [44]** The internal recovery signal path **106** is initiated by logic within the vehicle. This logic is programmed to detect when a legitimate operator is not controlling the vehicle. If some action or response is not forthcoming at the beginning or during a trip, the automatic internal recovery signal initiates the recovery process.
- [45]** The Alarm Discharge Apparatus **200** (from **Figure 1**) is in **Figure 3** represented by the elements in the **200** plus range. The Misappropriation Signal Handler **202**, an on-board processor, assesses recovery signal information, including pass codes and alternative instructions that may be available. Instructions are then passed to a recovery processor **210**. (Note that the misappropriation signal handler **202** and the recovery processor **210** may be combined into an inclusive processor.)
- [46]** The recovery processor **210** directs the vehicle disabling apparatus **230** to disable the vehicle. The method used by the disabling apparatus **230** may include, but is not limited to, stopping the fuel supply, turning off the electronic ignition and gradually diminishing the fuel supply.
- [47]** In one embodiment of the present invention, a cabin warning message **220** is played within the vehicle's cabin announcing that the vehicle will be disabled and the driver should come to a stop to avoid danger to the cabin passengers. In another embodiment, the recovery processor **210** utilizes a speed sensor **212** and only disables the vehicle when the speed is sufficiently slow (or the vehicle is stopped).
- [48]** The vehicle recovery system and method of the present invention involves discharging a highly detectable alarm such that a member of the public is likely to notice and respond. One embodiment uses a smoke flare similar to the type of flare used to signal the position of a ship or boat that is in distress. There are different colored smoke flares available that may be used. A yellow flare, for

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example, may be discharged to signal the whereabouts of a misappropriated vehicle. One embodiment discharges a smoke flare periodically, thus increasing the likelihood of detection and reaction by the public.

**[49]** The Recovery Processor **210** in one embodiment of the present invention utilizes an enclosure sensor **214** to determine if the vehicle is within an enclosure. The enclosure sensor **214** is able to detect enclosure by transmitting sonar waves and reading the echo of the transmitted sonar. Other technologies may be employed with similar utility. In an alternative embodiment, some electromotive frequency wave is transmitted and its echo read.

**[50]** An enclosed vehicle's enclosure sensor **214** will detect a high rate of echoed waves if the vehicle is enclosed. If the vehicle is not enclosed, then the Recovery Processor directs a flare positioning apparatus **240** to position one or more flares in preparation of ignition. Upon feedback from the flare positioning apparatus **240** that a flare is positioned such that the flare's smoke will be unencumbered, the Recovery Processor **210** directs a flare trigger apparatus **250** to ignite the smoke flare.

**[51]** The Recovery Processor **210** in another embodiment of the present invention relies on the speed sensor **212** before positioning **240** and igniting **250** the flare. In this embodiment, the Recovery Processor **210** detects the vehicle has been proceeding at some driving speed using the speed sensor **212**. When the vehicle has slowed sufficiently or stopped, the vehicle shutoff system **220** is engaged, with or without a cabin warning message **220** being played. As the vehicle is disabled, the smoke flare is simultaneous positioned **240** and ignited **250** thus allowing easy reporting as to the vehicle's location by the public.

**[52]** A vehicle recovery system and method have been described. It will also be understood that the invention may be embodied in other specific forms without

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**departing from the spirit or central characteristics thereof. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein**